Dräger
MEDICAL

Evita 4 Link™

Interface Card Option

Addendum to
Operating Instructions
Evita 4 / Evita 2 dura

1-178-95

NOTICE

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Important Safety Information

Operator's Responsibility for Patient Safety

For correct and effective use of the product and in order to avoid hazards it is mandatory to carefully read and to observe all portions of this manual.

The design of the intensive care ventilators this device is intended to be used with, accompanying literature, and the labeling on the equipment take into consideration that the purchase and use of the equipment are restricted to trained professionals, and that certain inherent characteristics of the equipment are known to the trained operator. Instructions, warnings, and caution statements are limited, therefore, largely to the specifics of the Draeger design. This publication excludes references to various hazards which are obvious to a medical professional and operator of respiratory care equipment, to the consequences of misuse of such equipment, and to potentially adverse effects in patients with abnormal conditions. Product modification or misuse can be dangerous. Draeger Medical, Inc. disclaims all liability for the consequences of product alterations or modifications, as well as for the consequences which might result from uses of the product not covered by its intended use or from the combination of this product with other products whether supplied by Draeger or by other manufacturers if such a combination is not endorsed by Draeger Medical, Inc..

The operators of ventilator systems must recognize their responsibility for choosing appropriate safety monitoring that supplies adequate information on equipment performance and patient condition. Patient safety may be achieved through a wide variety of different means ranging from electronic surveillance of equipment performance and patient condition to simple, direct observation of clinical signs. The responsibility for the selection of the best level of patient monitoring lies solely with the equipment operator.

Limitation of Liability

Draeger Medical, Inc.'s liability, whether arising out of or related to manufacture and sale of the goods, their installation, demonstration, sales representation, use, performance, or otherwise, including any liability based upon Draeger Medical, Inc.'s Product Warranty, is subject to and limited to the exclusive terms and conditions as set forth, whether based upon breach of warranty or any other cause of action whatsoever, regardless of any fault attributable to Draeger Medical, Inc. and regardless of the form of action (including, without limitation, breach of warranty, negligence, strict liability, or otherwise).

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Draeger Medical, Inc. shall not be liable for, nor shall buyer be entitled to recover any special incidental, or consequential damages or for any liability incurred by buyer to any third party in any way arising out of or relating to the goods.

Warranty

All Draeger products are guaranteed to be free of defects for a period of one year from date of delivery. The following are exceptions to this warranty:

1. The defect shall be a result of workmanship or material. Defects caused by misuse, mishandling, tampering, or by modifications not authorized by Draeger Medical, Inc. or its representatives are not covered.
2. Rubber and plastic components and materials are-warranted to be free of defects at time of delivery.
3. Oxygen sensors capsules have a six-month limited warranty from the date of delivery.

Any product which proves to be defective in workmanship or material will be replaced, credited, or repaired with Draeger Medical, Inc. holding the option. Draeger Medical, Inc. is not responsible for deterioration, wear, or abuse. In any case, Draeger Medical, Inc. will not be liable beyond the original selling price.

Application of this warranty is subject to the following conditions:

1. Draeger Medical, Inc. or its authorized representative must be promptly notified, in writing, upon detection of the defective material or equipment.
2. Defective material or equipment must be returned, shipping prepaid, to Draeger or its authorized representative.
3. Examination by Draeger Medical, Inc. or its authorized representative must confirm that the defect is covered by the terms of this warranty.
4. Notification in writing, of defective material or equipment must be received by Draeger Medical, Inc. or its authorized representative no later than two (2) weeks following expiration of this warranty.

In order to assure complete protection under this warranty, the Customer Registration Card and/or Periodic Manufacturer's Service Record (if applicable) must be returned to Draeger within ten (10) days of receipt of the equipment.

The above is the sole warranty provided by Draeger Medical, Inc. No other warranty expressed or implied is intended. Representatives of Draeger are not authorized to modify the terms of this warranty.

Draeger Medical, Inc., Telford, PA

Definitions

WARNING !

A WARNING statement refers to conditions with a possibility of personal injury if disregarded.

CAUTION !

A CAUTION statement designates the possibility of damage to equipment if disregarded.

NOTE: A NOTE provides additional information intended to avoid inconveniences during operation.

Inspection	=	examination of actual condition
Service	=	measures to maintain specified condition
Repair	=	measures to restore specified condition
Maintenance	=	inspection, service, and repair, where necessary
Preventive Maintenance	=	Maintenance measures at regular intervals

Typing conventions in this manual

Controls ("hard" keys and screen keys / fields / knobs) are designated as »**Control Name**«, e.g.

»**COM2**«

Screen pages are indicated as »Screen page«, e.g.

»Alarm limits«

On-screen messages are printed in **bold**, e.g.

MEDIBUS inop.

General WARNINGS and CAUTIONS

WARNING !

Strictly follow Operator's Instruction Manuals

Any use of the product requires full understanding and strict observation of all portions of these instructions as well as the Operating Instructions of the Evita 4 and Evita 2 dura ventilators, respectively. The equipment is only to be used for the purpose specified under "Intended Use" (page 8). Observe all WARNINGS and CAUTIONS as rendered throughout the manuals and on labels on the equipment.

WARNING !

DANGER, risk of explosion if used in the presence of flammable anesthetics.

The equipment is neither approved nor certified for use in areas where combustible or explosive gas mixtures with air or with nitrous oxide are likely.

WARNING !

Electrical connections to equipment which is not listed in these Operating Instructions should only be made following consultations with the respective manufacturers or a qualified expert.

WARNING !

All data displayed is for supplemental information purposes only. It may not be used as the sole basis of therapeutic decisions.

CAUTION !

Restriction of Distribution

Federal Law and Regulations in the United States and Canada restrict this device to sale by or on the order of a physician.

CAUTION !

Traceability

Federal Law in the United States requires traceability of this equipment. Please return the self addressed registration card included with the product and fill in the required information.

CAUTION !

Accessories

Use only accessories listed in the Ordering Information (page 34).

Precautions During Preparation

WARNING !

Installation of the Evita 4 Link Option may be performed by factory trained and authorized service personnel only.

Precautions During Operation

WARNING !

All data displayed is for supplemental information purposes only. It may not be used as the sole basis of therapeutic decisions.

CAUTION !

Analog Interface

Do not supply any external voltages to the analog interface output ports.

Precautions During Maintenance

WARNING !

To avoid any risk of infection, clean and disinfect ventilator and accessories before any maintenance according to established hospital procedures - this applies also when returning ventilators or parts for repair.

WARNING !

Preventive Maintenance work on Evita ventilators and their components may be performed by trained and factory authorized staff only.

WARNING !

Never operate the ventilator if it has suffered physical damage or does not seem to operate properly. In this case always refer servicing to properly trained and factory authorized service personnel.

CAUTION !

Maintenance

In case of malfunction of this device, contact your local DraegerService or our Factory Authorized Technical Service Center.

The device must be inspected and serviced (preventive maintenance) by competent and factory authorized technical service representatives at regular 6 month intervals. A record must be kept on this preventive maintenance. We recommend obtaining a service contract through your vendor.

Maintenance or repair of Evita ventilators and their installed options shall be performed only by Draeger authorized technical service representatives.

Intended Use

Evita 4 Link –
optional interface card for intensive care ventilators
Evita 4
or
Evita 2 dura.

For sending measured values, as well as status and alarm messages to connected equipment for monitoring, recording, or further data processing.

Both Draeger equipment and that of other manufacturers may be connected.

WARNING !

All data displayed is for supplemental information purposes only. It may not be used as the sole basis of therapeutic decisions.

The RS 232 interfaces conform to the requirements of standards "EIA RS 232 C" and "CCITV V.24".

Interfaces and communication protocols

Evita 4 Link provides two additional serial RS 232 interfaces, COM 2 and COM 3, two CAN interfaces, and a two channel analog interface.

Both serial interfaces, COM 2 and COM 3, may be used for transmitting according to the following protocols:
– LUST* protocol
– MEDIBUS™ ** protocol
– printer protocol

NOTE: The LUST protocol and printer protocol can each be used on only one interface at a time, whereas the MEDIBUS protocol can run on both simultaneously.

---

* LUST
List-controlled Universal Interface Driver,
compatible with Evita RS 232 interface as of software version 7.n

** MEDIBUS
Draeger communication protocol for medical equipment

Preparation

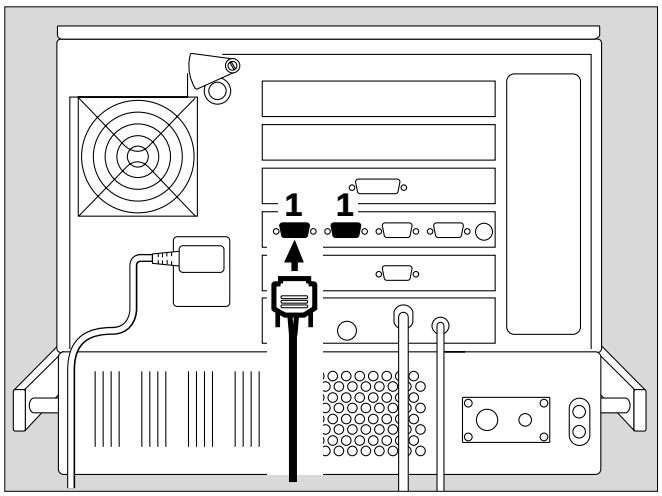
Installation

WARNING !

Installation of the Evita 4 Link interface card may be performed by factory trained and authorized service personnel only.

Connecting RS 232 Interface

with
MEDIBUS cable 83 06 488 for PC
or
printer cable 83 06 489 - for printer only
or
monitor cable 57 22 410 - for monitor.

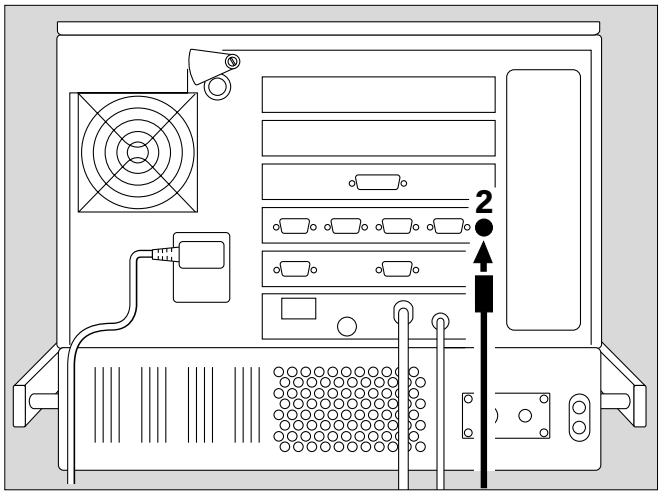


1 Insert connector into **COM2** or **COM3** socket at back of device.

- Attach other connector to device to be used.
- Secure connector = tighten knurled screws.
- Prepare device to be connected according to its respective Operating Instructions, connect, and switch on.

Connecting Analog Interface

with Evita 4 analog cable 84 11 759.



2 Insert connector into **analog** socket on the back panel of the ventilator.

- Prepare equipment to be connected according to its respective Operating Instructions, connect, and switch on.

Operation With Evita 4

RS 232 Interfaces

Devices connected via RS 232 interface must operate with the same protocol and the same transmission format set for Evita 4 Link.

Evita 4 offers the following interface protocols:

- MEDIBUS™ (Draeger communication protocol for medical devices)
- LUST (list-oriented unviversal serial interface driver, compatible with Evita RS 232 interface as of software 7.0)
- printer.

Selecting MEDIBUS protocol

When a PC or EvitaView™ PC program or a MEDIBUS™- compatible monitor is connected.

For detailed description of interface protocols – see Instructions for Use:

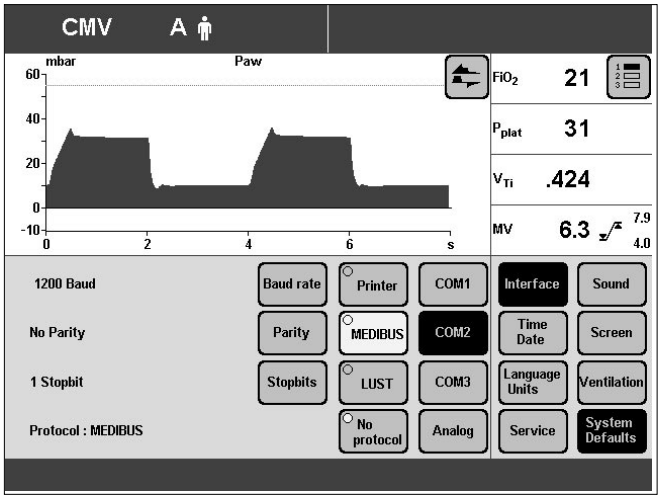
"MEDIBUS for Intensive Care Devices", document no. 90 28 329

and

"Draeger RS 232 MEDIBUS Protocol Definition" document no. 90 28 258.

Selecting interface protocol:

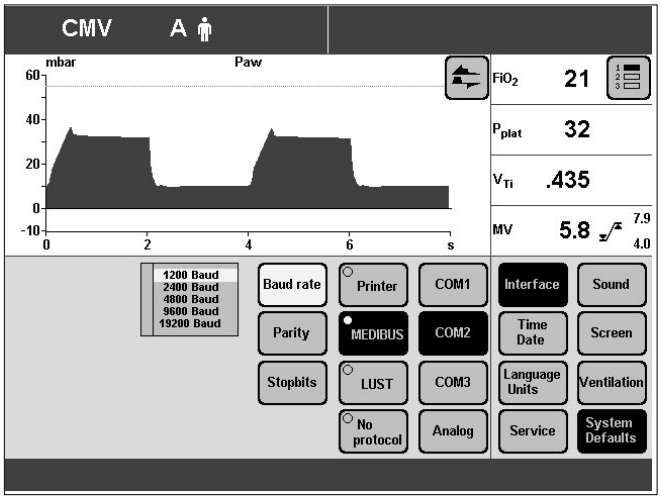
- Press »**Configuration**« key.
- Touch »**System Defaults**« screen key.
- Select appropriate connection using »**COM2**« or »**COM3**« screen keys.
  Example: COM2
- Touch »**MEDIBUS**« screen key.
- To confirm selection = press dial knob.



Setting interface parameters:

Set interface parameters (baud rate, parity and stop bits) to match those selected on connected equipment.

- Touch parameter screen key, e.g. »**Baud rate**«.
- Change value = turn dial knob.
- Confirm value = press dial knob.



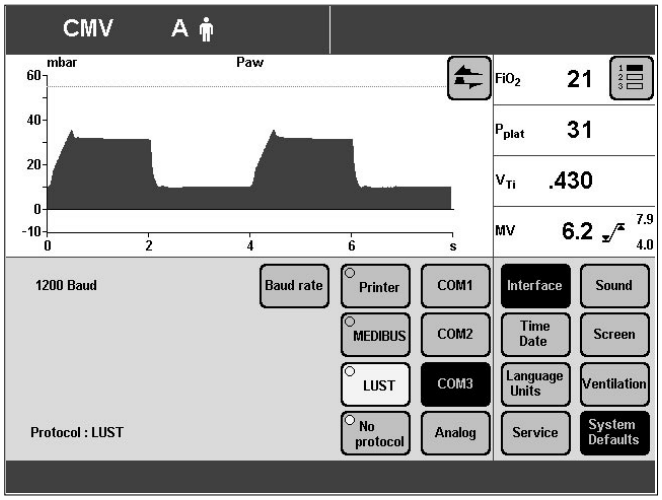
Selecting LUST protocol

- For a monitor which does not offer real-time waveforms.

For detailed description of interface protocol - see
Technical Description "LUST protocol", p.25.

Selecting interface protocol:

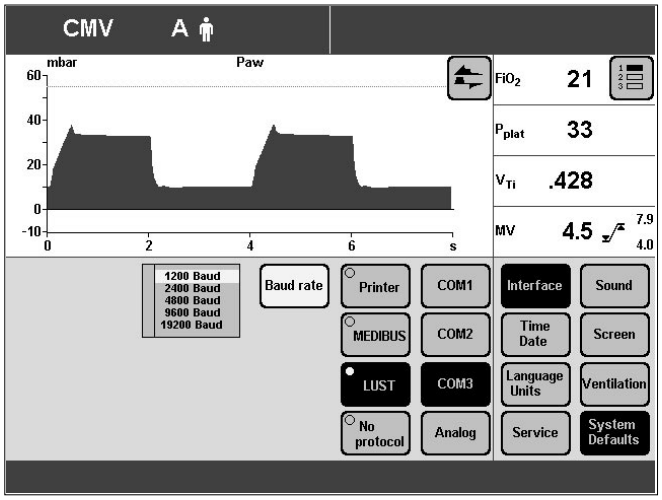
- Press »**Configuration**« key.
- Touch »**System Defaults**« screen key.
- Select appropriate connection using »**COM2**« or »**COM3**« screen keys.
- Touch »**LUST**« screen key.
- Confirm selection = press dial knob.



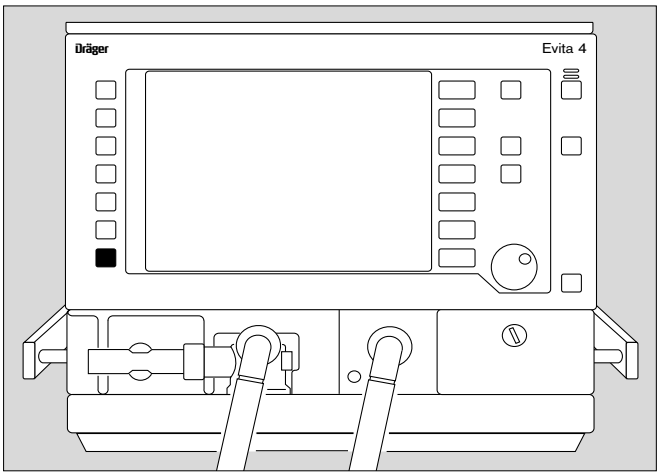
Setting transmission format:

Set baud rate to match that on connected device.

- Touch »**Baud rate**« screen key.
- Change value = turn dial knob.
- Confirm value = press dial knob.



Selecting printer protocol



For connecting a printer to Evita 4 (HP Deskjet 500 or compatible printer with serial interface).

All important values measured by Evita 4 and all settings which have been changed since the last printout are automatically printed out at adjustable time intervals (0 to 60 minutes). If the time interval is set at zero, there is no printout.

Any alarms triggered are printed independently of the time interval selected.

In addition, a printouts can be started manually by pressing the »**Printer**« key. The time interval already selected will not be affected.

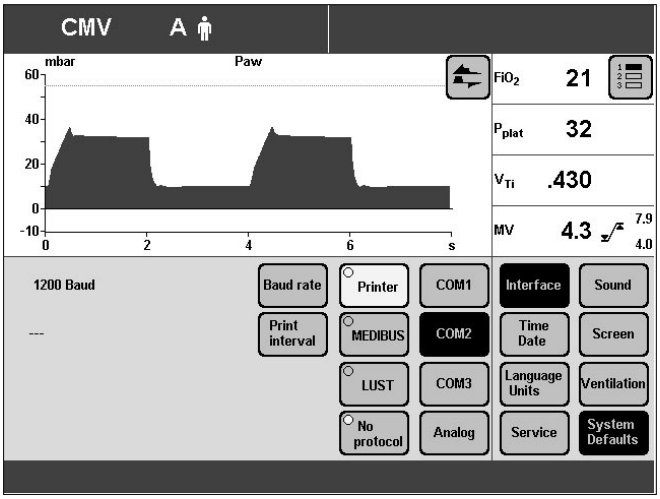
First

- Connect printer, prepare following its respective Operating Instructions, and switch on.

Then

Select interface protocol:

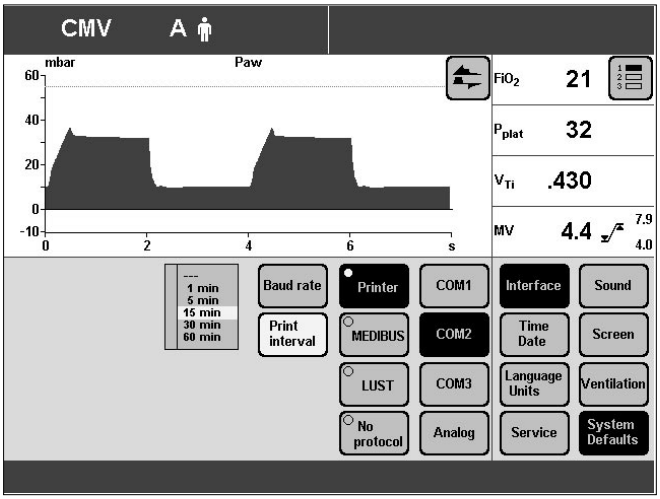
- Press »**Configuration**« key.
- Touch »**System Defaults**« screen key.
- Select appropriate connection using »**COM2**« or »**COM3**« screen keys.
- Touch »**Printer**« screen key.
- Confirm selection = press dial knob.



Setting transmission format:

Set baud rate to match that on connected device.

- Touch »**Print Interval**« screen key.
- Change value = turn dial knob.
- Confirm value = press dial knob.

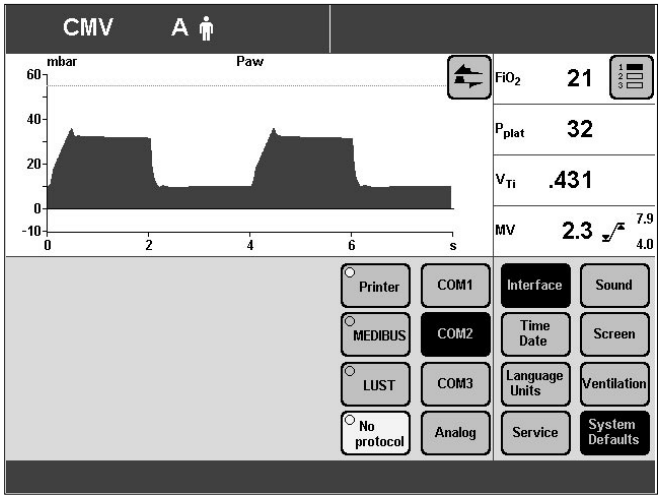


Switching off interface

The interface may be switched off when not in use.

Switching off interface:

- Press »**Configuration**« key.
- Touch »**System Defaults**« screen key.
- Select appropriate connection using »**COM2**« or »**COM3**« screen keys.
- Touch »**No protocol**« screen key.
- Confirm selection = press dial knob.



Analog Interface

The Evita 4 Link analog interface has two analog channels to which signals of measured values can be freely assigned.

Data

Voltage level:

The analog signals provided are in 0 to 4.095 V voltage range.

CAUTION !

Analog Interface

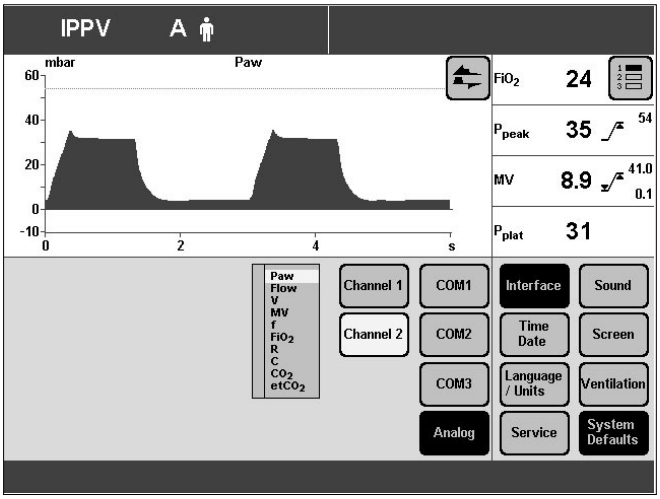
Do not supply any external voltages to the analog interface output ports.

Pin layout

Pin 1	Analog mass This connection is the reference point for both analog channels.
Pin 2	Analog channel 1
Pin 3	Analog channel 2

Selecting analog signals of measured values

- Press »**Configuration**« key.
- Touch »**System Defaults**« screen key.
- Touch »**Analog**« screen key.
- Select appropriate analog channel using »**Channel 1**« or »**Channel 2**« screen keys.
- Select measured value signal = turn dial knob.
- Confirm selection = press dial knob.



Voltage ranges for analog signals of measured values

Measured value	Description	Range/ Voltage level
Paw	Airway pressure	–10 to 100 mbar 0 to 4.095 V
Flow	Expiratory and inspiratory flow	–196 to 196 L/min 0 to 4.095 V
V	Expiratory and inspiratory volume	0 to 2 L 0 to 4.095 V
MV	(Tidal) Minute volume	0 to 41 L/min 0 to 4.095 V
f	(Ventilator) Rate	0 to 150 bpm 0 to 4.095 V
FiO2	Inspiratory O_2 concentration	0 to 100 Vol.% 0 to 4.095 V
R	Resistance	0 to 100 mbar/L/s 0 to 4.095 V
C	Compliance	0 to 250 mL/mbar 0 to 4.095 V
CO2	Expiratory CO_2 concentration	0 to 15 kPa 0 to 4.095 V
etCO2	Endexpiratory CO_2 concentration	0 to 15 kPa 0 to 4.095 V
NO	Inspiratory flow for NOdomo	0 to 125 L/min 0 to 4.095 V

CAN Interfaces

CAN **C**ontroller **A**rea **N**etwork
interference-free high-speed bus

NOTE: The CAN interface is the interface of choice for future Draeger monitors. The CAN interface cannot be used with Evita 4 at present.

Operation With Evita 2 dura

RS 232 Interfaces

Devices connected via RS 232 interface must operate with the same protocol and the same transmission format as set for Evita 4 Link.

Evita 2 dura offers the following interface protocols:

- MEDIBUS™ (Draeger communication protocol for medical devices)
- LUST (list-oriented unviversal serial interface driver, compatible with Evita RS 232 interface as of software 7.0)
- printer.

Setting interface protocols:

Please refer to Operating Instructions of connected devices.

For MEDIBUS protocol:
Baud rate
parity check bits
number of stop bits

For LUST protocol:
Baud rate

For printer protocol:
Baud rate
Print interval as needed.

Selecting MEDIBUS protocol

When a PC or EvitaView™ PC program or a MEDIBUS™- compatible monitor is connected.

For detailed description of interface protocols – see Instructions for Use:

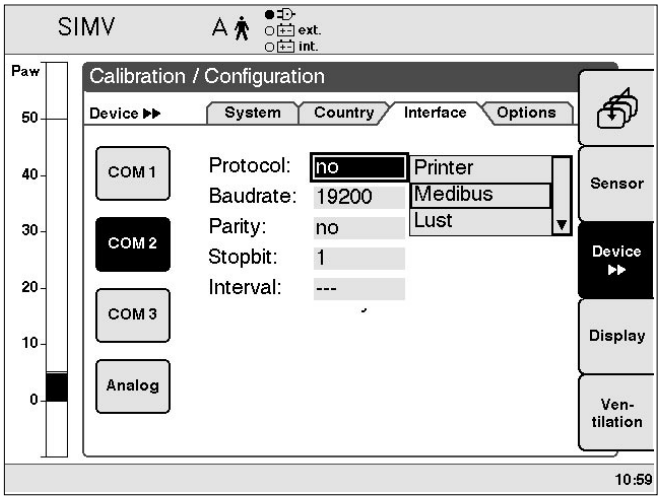
"MEDIBUS for Intensive Care Devices",
document no. 90 28 329

and

"Draeger RS 232 MEDIBUS Protocol Definition"
document no. 90 28 258.

Selecting interface protocol:

- Press »**Calib./Config.**« menu key.
- Press »**Device**« menu key.
- Select »Interface« menu page with »**Device ▶▶**« menu key.
- Select the desired port, e.g. »**COM2**« or »**COM3**« = turn dial knob
  Example: COM2
  Confirm = press dial knob.
- Select screen field »**Protocol**« = turn dial knob, and confirm selection = press dial knob.
  Toewards the right side of the screen a list of available protocols will be displayed.
- Select »**MEDIBUS**« = turn dial knob.
  Confirm = press dial knob.



Setting interface parameters:

Set interface parameters (baud rate, parity and stop bits) to match those selected on connected equipment.

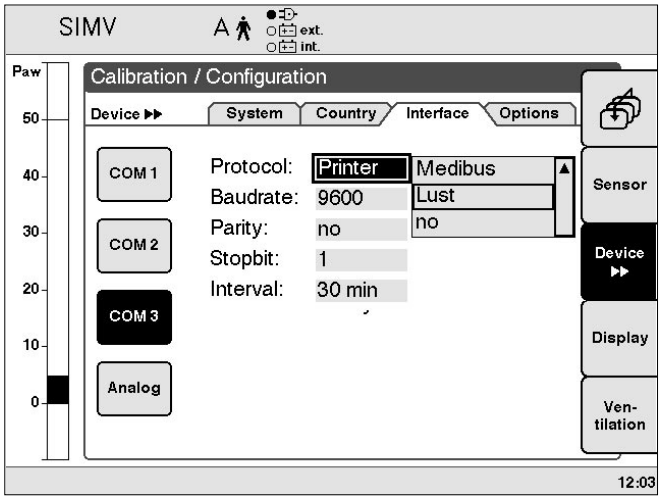
- Select parameter, e.g. **"Baud rate"**. = turn dial knob.
  Confirm = press dial knob.
- Change value = turn dial knob.
  Confirm value = press dial knob.

Selecting LUST protocol

- For monitors not offering real-time waveforms.

For detailed description of interface protocol - see Technical Description "LUST protocol", p. 25.

Selecting interface protocol:



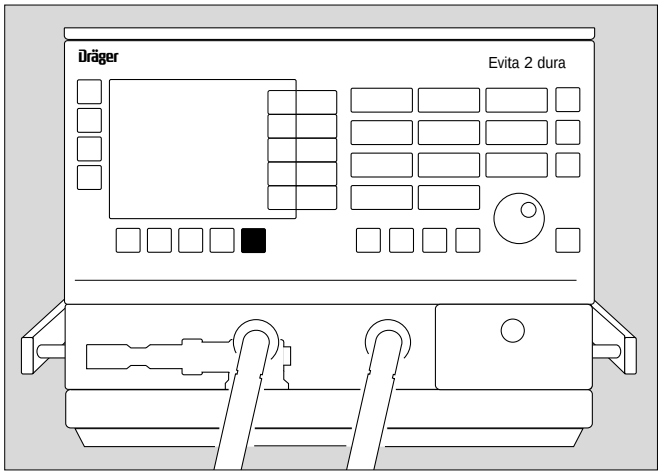
- Press »**Calib./Config.**« menu key.
- Press »**Device**« menu key.
- Select »Interface« menu page with »**Device ▶▶**« menu key.
- Select the desired port, e.g. »**COM2**« or »**COM3**« = turn dial knob
  Example: COM3
  Confirm = press dial knob.
- Select screen field »**Protocol**« = turn dial knob, and confirm selection = press dial knob.
  On the right side of the screen a list of available protocols is displayed.
- Select »**LUST**« = turn dial knob.
  Confirm = press dial knob.

Setting interface parameters:

Set interface parameters (baud rate, parity and stop bits) to match those selected on connected equipment.

- Select parameter, e.g. »**Baud rate**". = turn dial knob.
  Confirm = press dial knob.
- Change value = turn dial knob.
  Confirm value = press dial knob.

Selecting printer protocol



For connecting a printer to Evita 2 dura (HP Deskjet 500 or compatible printer with serial interface).

All important values measured by Evita 2 dura and all settings which have been changed since the last printout are automatically printed at adjustable time intervals (0 to 60 minutes). If the time interval is set at zero, there is no printout.

Any alarms triggered are printed independently of the time interval selected.

In addition, a printout can be started manually by pressing the »**Printer**" key. The time interval already selected will not be affected.

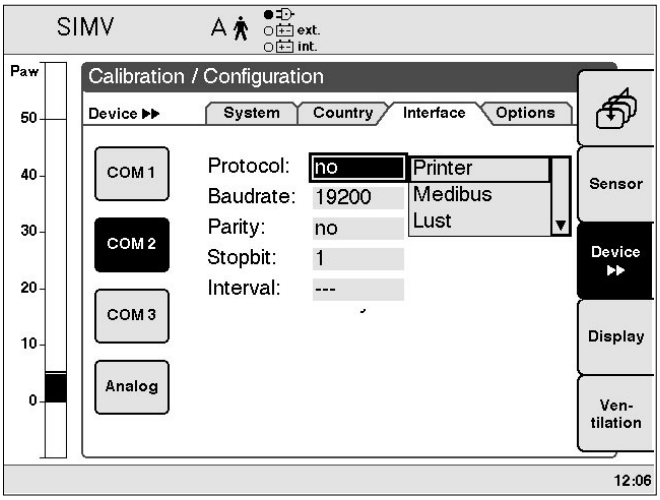
First

- Connect printer, prepare following its respective Operating Instructions, and switch on.

Then

Select interface protocol:

- Press »**Calib./Config.**« menu key.
- Press »**Device**« menu key.
- Select »Interface« menu page with »**Device ▶▶**« menu key.
- Select the desired port, e.g. »**COM2**« or »**COM3**« = turn dial knob
  Example: COM2
  Confirm = press dial knob.
- Select screen field »**Protocol**« = turn dial knob, and confirm selection = press dial knob.
  On the right side of the screen a list of available protocols is displayed.
- Select »**Printer**« = turn dial knob.
  Confirm = press dial knob.



Set baud rate to match those selected on connected printer:

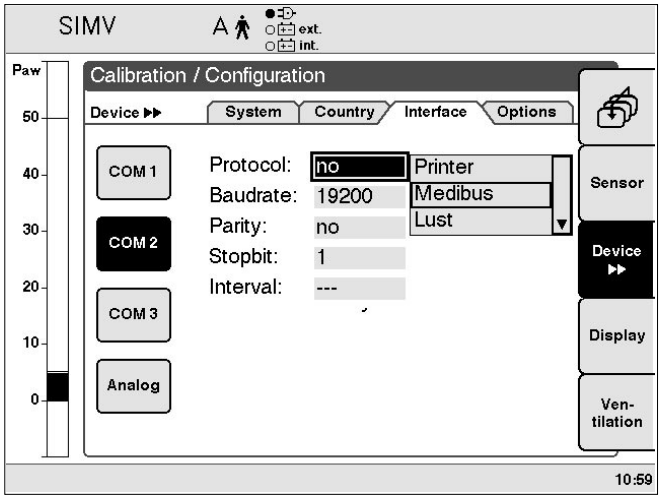
- Select parameter »**Baud rate**". = turn dial knob.
  Confirm = press dial knob.
- Change value = turn dial knob.
  Confirm value = press dial knob.

Set print interval:

- Select parameter »**Baud rate**". = turn dial knob.
  Confirm = press dial knob.
- Change value = turn dial knob.
  Confirm value = press dial knob.

Switching off interface

The interface may be switched off when not in use.



Switching off interface:

- Press »**Calib./Config.**« menu key.
- Press »**Device**« menu key.
- Select »Interface« menu page with »**Device ▶▶**« menu key.
- Select the desired port, e.g. »**COM2**« or »**COM3**« = turn dial knob
  Example: COM2
  Confirm = press dial knob.
- Select screen field »**Protocol**« = turn dial knob, and confirm selection = press dial knob.
  On the right side of the screen a list of available protocols is displayed.
- Select »**No**« = turn dial knob.
  Confirm = press dial knob.

Analog Interface

The Evita 4 Link analog interface has two analog channels to which signals of measured values can be freely assigned.

Data

Voltage range for analog signals provided is:
0 to 4.095 V

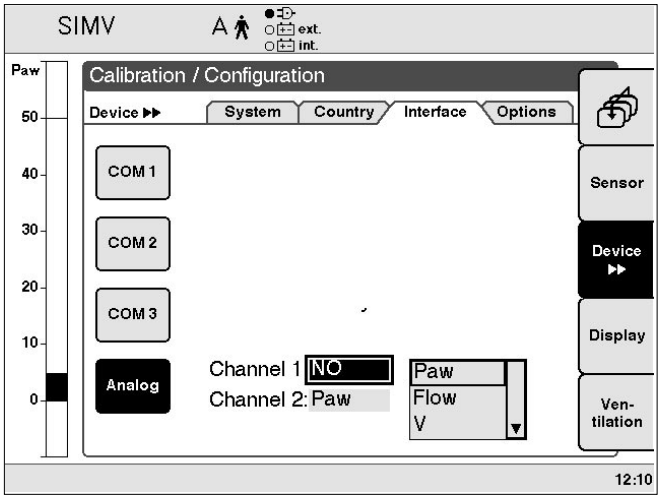
CAUTION !

Analog Interface

Do not supply any external voltages to the analog interface output ports.

Selecting analog signals of measured values

- Press »**Calib./Config.**« menu key.
- Press »**Device**« menu key.
- Select »Interface« menu page with »**Device ▶▶**« menu key.
- Select »**Analog**« port = turn dial knob
  Confirm = press dial knob.
- Select screen field »**Channel 1**« or screen field »**Channel 1**« = turn dial knob,
  and confirm selection = press dial knob.
  On the right side of the screen a list of available measured signals is displayed.
- Select desired signal = turn dial knob.
  Confirm = press dial knob.



Voltage ranges for analog signals of measured values

Measured value	Description	Range/ Voltage level
Paw	Airway pressure	–10 to 100 mbar 0 to 4.095 V
Flow	Expiratory and inspiratory flow	–196 to 196 L/min 0 to 4.095 V
V	Expiratory and inspiratory volume	0 to 2 L 0 to 4.095 V
MV	(Tidal) Minute volume	0 to 41 L/min 0 to 4.095 V
f	(Ventilator) Rate	0 to 150 bpm 0 to 4.095 V
FiO2	Inspiratory O_2 concentration	0 to 100 Vol.% 0 to 4.095 V
R	Resistance	0 to 100 mbar/L/s 0 to 4.095 V
C	Compliance	0 to 250 mL/mbar 0 to 4.095 V
CO2	Expiratory CO_2 concentration	0 to 15 kPa 0 to 4.095 V
etCO2	Endexpiratory CO_2 concentration	0 to 15 kPa 0 to 4.095 V
NO	Inspiratory flow for NOdomo	0 to 125 L/min 0 to 4.095 V

CAN Interfaces

CAN **C**ontroller **A**rea **N**etwork
interference-free high-speed bus

NOTE: The CAN interface is the interface of choice for future Draeger monitors. The CAN interface cannot be used with Evita 4 or Evita 2 dura at present.

Troubleshooting

Alarm messages in the alarm display field are displayed in hierarchical order.
If, for example, two faults are detected at the same time, the more urgent of the two is displayed.

The priority for alarm messages is indicated by exclamation marks:
Warning = Message with top priority **!!!**
Caution = Message with medium priority **!!**
Advisory = Message with low priority **!**

Message	Cause	Remedy
MEDIBUS inop **!**	MEDIBUS cable has become disconnected during operation.	Re-connect and tighten both screws.
	Faulty MEDIBUS cable.	Use new MEDIBUS cable.
	Faulty interface card.	Call DraegerService.

Maintenance

CAUTION !

Maintenance

In case of malfunction of this component, contact your local DraegerService or our Factory Authorized Technical Service Center.

The devices must be inspected and serviced (preventive maintenance) by competent and factory authorized technical service representatives at regular 6 month intervals. A record must be kept on this preventive maintenance. We recommend obtaining a service contract through your vendor.

Maintenance or repair of Evita ventilators shall be performed only by Draeger authorized technical service representatives.

WARNING !

To avoid any risk of infection, clean and disinfect ventilator and accessories before any maintenance according to established hospital procedures - this applies also when retur-ning ventilators or parts for repair.

WARNING !

Preventive Maintenance work on Evita ventilators and their components may be performed by trained and factory authorized staff only.

WARNING !

Never operate the ventilator if it has suffered physical damage or does not seem to operate properly. In this case always refer servicing to properly trained and factory authorized service personnel.

Maintenance Intervals

Preventive maintenance	Every 6 months by trained and factory authorized service personnel.

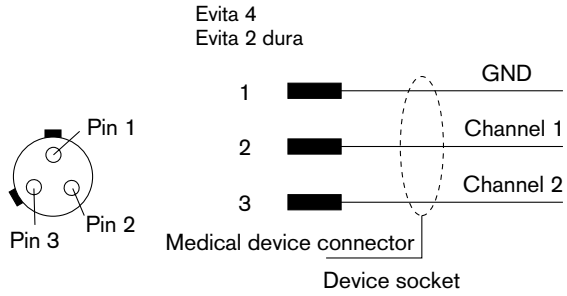
The Evita 4 Link option is serviced as part of the scheduled preventive maintenance of the Evita 4 and Evita 2 dura ventilators every six months.

Technical Data

RS 232 interfaces

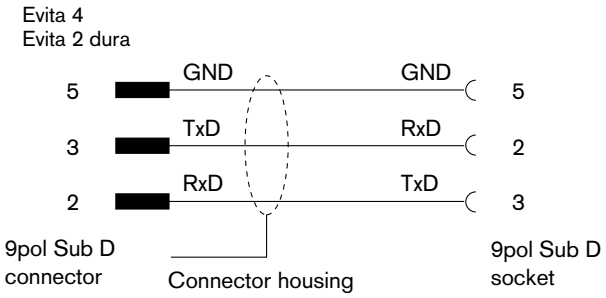
COM 2 and COM 3 can be configured for:	LUST protocol Baud rate: 1200, 2400, 4800, 9600, 19200 baud Data bits: 7 Parity: even Stop bits: 2
	MEDIBUS protocol Baud rate: 1200, 2400, 4800, 9600, 19200 baud Data bits: 8 Parity: even, odd, none Stop bits: 1 or 2 (for fast transmission of data, e.g. for Flow waveform, 19200 baud required)
	Printer protocol HP Deskjet Baud rate: 1200, 2400, 9600, 19200 baud Data bits: 8 Parity: none Stop bits: 1
Length of cable	up to 15 m (50 ft)
Impedance	3000 to 7000 Ω
Signal level (for impedance 3000 to 7000 Ω)	
Low	between 3 and 15 V
High	between –3 and –15 V
Electrical isolation	COM 2 and COM 3 connecting sockets are electrically isolated from the electronics of the device. Test voltage for this isolation is 1500 V. COM 2 and COM 3 connecting sockets are not electrically isolated from each other.
Pin layout	Pin 2 RxD Pin 3 TxD Pin 5 GND Ventilator enclosure Connector body

Analog interface

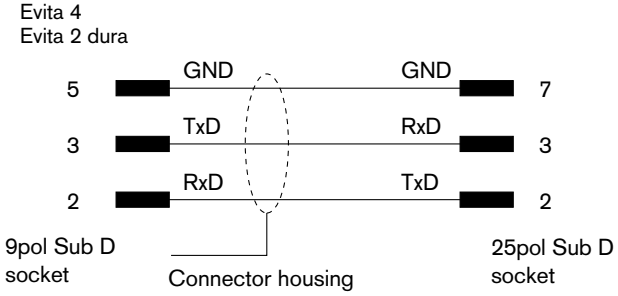
Voltage level	0 to 4.095 V
Impedance of analog channels	Output impedance is 200 Ω. To prevent corruption of the output signal, input impedance of the connected device should not fall below 1 MΩ.
Accuracy	0 V : 0 V to 0.005 V 4.095 V : 4.075 V to 4.115 V
Pin layout	
Electrical isolation	The connecting socket is electrically isolated from the electronics of the device. The test voltage for this electrical isolation is 1500 V. The analog channels are not electrically isolated from each other.

Pin layout of data cable

MEDIBUS cable



Printer cable



Technical Description

LUST protocol

LUST:
List-controlled Universal Interface Driver compatible with Evita RS 232 interface as of software version 7.n.

The LUST protocol consists of 4 different transmission telegrams:
– identification telegram
– status telegram
– data telegram
– alarm telegram

The first 3 telegrams are only transmitted in response to a request from a connected device.
The alarm telegram is transmitted automatically when an alarm occurs or is deactivated.

Telegrams

The following ASCII codes* are used to request different telegrams:

"ACK" request for identification telegram.
"NAK" request for status telegram.
"ENQ" request for data telegram.

Certain codes are used for transmitting of all telegrams:

"DC1" (x-on) releases transmission of telegrams.
"DC3" (x-off) stops transmission at any given time.

After release ("DC1") the transmission of an interrupted telegram will go ahead without any updating.
Requesting a telegram overrides the effect of "DC3": any telegram interrupted by "DC1" will be lost, and the telegram requested will be transmitted.

Certain codes are also used for transmitting an alarm telegram:

"DC2" releases the transmission of alarm telegrams.
"DC4" stops the transmission of alarm telegrams.

Any transmissions under way are not interrupted by "DC4" - this can only be done with "DC3" (x-off).
A telegram request ("ACK", "ENQ" or "NAK") does not override a stop on the transmission of alarm telegrams.

After a "DC2" the last of the alarms already triggered is transmitted. When there have been no new alarms, each "DC2" requests an alarm telegram of all active alarms.

Unknown control codes are ignored.

* A list of special ASCII codes can be found on p. 27.

Identification telegram

The identification telegram contains a description of the device and also a list of all measured values transmitted in the data telegram. It is made up as follows:

Telegram header

"STX" start code
050 identification number
0 channel number

Telegram body

The body of the telegram contains the device name first: e.g. "ESC Evita 4"

An optional number of blocks then follow, which are separated by "ESC". Each block contains all the information relating to a measured value, separated by "RS". Each block is made up as follows:

"ESC" (signal number) "RS" (signal name, long form) "RS" (signal name, short form) "RS" (unit) "RS" (minimum) "RS" (maximum)

The table shows a complete identification telegram:

Signal No.	Name Long form	Short Form	Unit	Min.-Value	Max.-Value
00	Time	t	h:min	.0,00	23,59
01	Exp. tidal volume	VTe	L	0,000	2,000
02	Breathing Frequency	f	1/min	...0	240
03	Minute Volume	MV	L/min	.0,00	99,99
04	Peak-pressure	Peak	mbar	..0	120
05	Plateau-pressure	Plat	mbar	.0	99
06	PEEP-pressure	PEEP	mbar	.0	99
07	Minimum-pressure	Pmin	mbar	-20	99
08	Mean-pressure	Mean	mbar	.0	99
09	Insp. O2-concentration	FiO2	%	.5	99
10	Compliance	C	mL/mbar	..0	255
11	Resistance	R	mbar/(L/s)	..0	200
12	Spont. Minute Volume	MVs	L/min	.0,00	99,99
13	Spont. frequency	f s	1/min	..0	240
14	Airway temperature	Temp	deg C	18	45
15	Intrinsic PEEP	Pintr	L/min	.0,0	99,9
16	Trapped Volume	Vtrap	mL	...0	9999
17	Occlusion Pressure	P01	mbar	.0,0	99,9
18	End tidal CO2 in mmHg	CO2E1	mmHg	.0	99
19	End tidal CO2 in kPa	CO2E2	kPa	.0,0	99,9
20	End tidal CO2 in %	CO2E3	%	.0	99
21	CO2 Production	CO2P	mL/min	..0	999
22	Dead Space	Vds	mL	..0	999
23	Rel. Dead Space	Vds rel	%	..0	999
24	SpO2	SpO2	%	..0	100
25	Pulse	Puls	bpm	..0	999

Leading zeros (shown in the table by "0.0" or "...0" are replaced with one or two blanks.

Telegram end

"EOT"

Status telegram

The status telegram contains all set values, alarm limits, ventilation modes and status messages. It is structured as follows:

Telegram header

"SOH"	start symbol
050	identification number
0	channel number

Telegram body

The body of the telegram may contain any number of status messages, as required, separated by a "GS". Each status message consists of one number and one name.

"GS" (number of status message) (text of message)

Data, e.g. set values and alarm limits are included in the status message by "FS" symbols.

The following tables contain all status messages.

Set values

00	date : "FS"dd"FS"-"FS"mm"FS"-"FS"yy"FS"
01	O2 setting-value = "FS"nnn"FS" %
02	Max. inspiratory flow = "FS"nnn"FS" L/min
03	Insp. tidal volume = "FS"n,nnn"FS" L
06	I : E = "FS"%n,n"FS" : "FS"1,0"FS"
06	I : E = "FS"1,0"FS" : "FS"%n,n"FS"
07	Max. breathing pressure = "FS"nnn"FS" mbar
08	Frequency = "FS"nnn,n"FS" 1/min
09	PEEP = "FS"nn"FS" mbar
10	ASB = "FS"nn"FS" mbar
11	Interm. PEEP = "FS"nn"FS" mbar
12	APRV P-low = "FS"nn"FS" mbar
13	APRV P-high = "FS"nn"FS" mbar
14	APRV T-low = "FS"nn,n"FS" s
15	APRV T-high = "FS"nn,n"FS" s
16	ApneaTime = "FS"nn"FS" s
17	Tachypnea warning = "FS"nnn"FS" bpm
18	Flow Trigger = "FS"nnn"FS" L/min
19	Pressure increase rate = "FS"n,nn"FS" s
28	Pinsp = "FS"nn,n"FS" mbar
84	Ti = "FS"nn,nn"FS" s
87	Flow Assist = "FS"nnn,n"FS" mbar*s/L
88	Volume Assist = "FS"nnnn,n"FS" mbar/L

Alarm limits

20	MV low limit = "FS"nn,n"FS" L/min
21	MV high limit = "FS"nn,n"FS" L/min
24	Flow monitoring on
24	Flow monitoring off
25	CO2 upper limit = "FS"nnn"FS"mmHg
25	CO2 upper limit = "FS"nn,n"FS"%
25	CO2 upper limit = "FS"nn,n"FS"kPa
26	CO2 lower limit = "FS"nnn"FS"mmHg
26	CO2 lower limit = "FS"nn,n"FS"%
26	CO2 lower limit = "FS"nn,n"FS"kPa
27	PawLimit = "FS"nnn"FS" mbar
29	Insp. tidal volume high limit = "FS"n,nn"FS" L
80	Pulse high limit = "FS"nnn"FS" bpm
81	Pulse low limit = "FS"nnn"FS" bpm
82	Saturation O2 high limit = "FS"nnn"FS" %c
83	Saturation O2 low limit = "FS"nnn"FS" %c

Ventilation modes

30	Mode IPPV
31	Mode IPPV/ASSIST
34	Mode SIMV
35	Mode SIMV/ASB
38	Mode CPAP
39	Mode CPAP/ASB
40	Mode MMV
41	Mode MMV/ASB
42	Mode APRV
43	Mode SYNCHRON MASTER
44	Mode SYNCHRON SLAVE
45	Mode Apnea ventilation
45	Mode Apnea ventilation
48	Mode BIPAP
49	Mode BIPAP/ASB
60	Mode SIMV/AutoFlow
61	Mode SIMV/ASB/AutoFlow
62	Mode IPPV/AutoFlow
63	Mode IPPV/ASSIST/AutoFlow
64	Mode MMV/AutoFlow
65	Mode MMV/ASB/AutoFlow
66	Mode ASYNCHRON MASTER
67	Mode CPAP/PPS

Status messages

24	Flow monitoring on
24	Flow monitoring off
50	Audio alarm inactive on
50	Audio alarm inactive off
51	Nebulizer on
51	Nebulizer off
53	O2 calibration on
53	O2 calibration off
54	O2 monitoring on
54	O2 monitoring off
55	Suction on
55	Suction off
56	Flow calibration on
56	Flow calibration off
57	CO2 calibration on
57	CO2 calibration off
58	CO2 monitoring on
58	CO2 monitoring off
85	SpO2 monitoring on
85	SpO2 monitoring off
97	Neonates
98	Adult
99	Pediatric

Telegram end

"EOT"

Data telegram

The data telegram transmits all current measured values specified in the identification telegram. Invalid measured values are shown by dashes instead of numerical values. In addition, the data telegram contains all the messages in the status telegram which have changed since the last status or data telegram.

The telegram is structured as follows:

Telegram header

"SOH"	start symbol
050	identification number
0	channel number

Telegram body

The telegram body contains all measured values specified in the identification telegram as well as a variable number of status messages.
The number of digits for the measured values is specified in the identification telegram (maximum of 5).
Commas are also transmitted; leading zeros are replaced by blanks.

"ESC" (signal number) (measured value)
"GS" (number of status message) (text of message)
"GS" (number of status message) (text of message)

Telegram end

"EOT"

Alarm telegram

Alarm telegrams cannot be requested; they are transmitted automatically as soon as there is a change in alarm status. However, automatic alarm transmission can be switched on or off, see "Telegrams", page 25.

Separate messages are transmitted
– when an alarm occurs,
– when the alarm status is cancelled.

The alarm telegram is structured as follows:

Telegram header

"BEL"	start symbol
050	identification number
0	channel number

Telegram body

"ESC"	(warning/caution/advisory) (status) (alarm number) (alarm text)

The different fields have the following meanings:

01	Device failure
02	Air supply down
03	O2 supply down
04	pressure meas. inop
05	O2 measurement inop
06	flow measurement inop
07	mixer inop
08	exp. valve inop
09	fan 1 defect
10	temperature meas. inop
12	temperature high
13	flow sensor ?
14	PEEP high
15	CO2 measurement inop
16	CO2 sensor ?
17	clean CO2 cuvette
18	CO2 zero ?
22	apnea
23	FiO2 high
24	FiO2 low
25	MV low
26	MV high
27	airway pressure low
28	airway pressure high
29	fail to cycle
30	high frequency
32	volume not constant
33	ASB > 4 s
34	etCO2 high

35	etCO2 low
36	air supply pressure high
37	air supply high
38	apnoea ventilation
39	Insp. hold interrupted
40	loss of data
41	Flow monitoring off
42	Monitoring FiO2 off
43	Monitoring CO2 off
44	Monitoring SpO2 off
45	O2 supply high
46	fan 2 defect
47	malfunction fan 2
48	malfunction fan 1
49	SpO2 low
50	SpO2 high
51	pulse low
52	pulse high
53	no pulse
54	SpO2 sensor ?
55	SpO2 meas. inop
57	battery not loaded
58	battery only for 2 min.
59	int. battery activated
60	ext. battery wrong
61	PEEP valve inop
62	neo. flow meas. inop
63	standby activated
64	nebulizer on
65	Tidalvolume high
67	check evita
68	frequency ILV Slave ?
69	pressure limited
70	ILV sync. inop
71	MEDIBUS inop
73	ASB > 1.5 s
74	Leakage
75	neo.flow monitoring off
76	neo.flowsensor unsuitable
78	PPS-insp.> 1.5 s
79	PPS-insp.> 4 s
80	ASB > T_{insp}
81	backup ventilation
82	Exsp. hold interrupted
83	neo. flow?

Telegram end

"EOT"

ASCII Special Codes Used

Code	Explanation	Hexadecimal code	Control code
NUL	Null	00	^@
SOH	Start of Heading	01	^A
STX	Start of Text	02	^B
ETX	End of Text	03	^C
EOT	End of Transmission	04	^D
ENQ	Enquiry	05	^E
ACK	Acknowledge	06	^F
BEL	Bell	07	^G
BS	Backspace	08	^H
HT	Horizontal Tabulation	09	^I
LF	Line Feed	0A	^J
VT	Vertical Tabulation	0B	^K
FF	Form Feed	0C	^L
CR	Carriage Return	0D	^M
SO	Shift Out	0E	^N
SI	Shift In	0F	^O
DLE	Data Link Escape	10	^P
DC1	Device Control 1	11	^Q
DC2	Device Control 2	12	^R
DC3	Device Control 3	13	^S
DC4	Device Control 4	14	^T
NAK	Negative Acknowledge	15	^U
SYN	Synchronous Idle	16	^V
ETB	End of Transmission Block	17	^W
CAN	Cancel	18	^X
EM	End of Medium	19	^Y
SUB	Substitute	1A	^Z
ESC	Escape	1B	^[
FS	File Separator	1C	^\
GS	Group Separator	1D	^]
RS	Record Separator	1E	^^
US	Unit Separator	1F	^_
SP	Space	20	
DEL	Delete	7F	

Ordering Information

Name/Description	Part No.
Evita 4 Link™ communication interface kit	84 11 735
MEDIBUS™ cable	83 06 488
Printer cable	83 06 489
Evita 4/NOdomo cable	83 09 007
Evita 4 Analog cable For details of connections and their layout, see p. 18	84 11 759
PC EvitaView™ /BabyView™ software (for IBM-compatible PCs, with MS Windows® 3.1 software)	83 09 099
Operating Instructions MEDIBUS for Intensive Care Devices	90 28 329
Operating Instructions Draeger RS 232 - MEDIBUS Protocol Definition	90 28 258

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These Operating Instructions apply only
☐ to **Evita 4** with Serial No.:
☐ to **Evita 2 dura** with Serial No.:

(check applicable)

Without entry of a Serial No. by Draeger these Operating Instructions are provided for general information only and are not intended for use with a specific device.

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